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A DESCRIPTION OF "TUFTS" AND CONCEALING POSTURE IN NORTHERN PYGMY-OWLS

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ABSTRACT.—We describe concealing posture for the Northern Pygmy-Owl (*Glaucidium gnoma*). Head tufts, previously undescribed for this species, are part of the concealing posture. The tufts are actually extensions of the eyebrows. We believe that camouflage and disruptive coloration are used synergistically. We also believe that the concealing posture described aids the owls in hiding from predators and from mobbing by potential prey species.

Una descripción de los penachos y las facilidades miméticas de los buhos de la especie *Glaucidium gnoma*

EXTRACTO.—Describimos la capacidad de mimetismo de los buhos de la especie *Glaucidium gnoma*. Los penachos que previamente no han sido descritos en esta especie, son una ayuda a esa capacidad mimética. Los penachos son extensiones de las cejas. Creemos que el camuflaje y la coloración disruptiva son usados simultaneamente. También creemos que la capacidad de mimetismo descrita, ayuda a estos buhos para esconderse de los predadores y para evitar la alerta de sus posibles presas.

[Traducción de Eudoxio Paredes-Ruiz]

The Northern Pygmy-Owl (*Glaucidium gnoma*) is widely distributed in western North America (AOU 1983). Except for a few observational reports (Holman 1926, Holt and Norton 1986), aspects of the biology and ecology of this species are among the least known of North American owls. Although frequently observed during the non-breeding season, Northern Pygmy-Owls are very difficult to locate during the breeding season (D.W. Holt, unpubl. data), consequently few nests have been described (Norton and Holt 1982, Bull et al. 1987). Even the natural history of this species has barely been outlined. In this note, we describe a concealment posture previously unreported for the Northern Pygmy-Owl.

Owls can be separated for identification purposes into those with horns or eartufts and those with round heads. Hereafter, horns and eartufts will be called tufts, denoting the specialized feathers arising from the heads of many owl species. Little information exists describing the adaptive significance of tufts in owls, although it is generally believed that tufts aid in concealment or hiding.

Approximately 75 of 162 species of owls in the world (Amadon and Bull 1988) possess conspicuous tufts. The majority of these species occur in the genera *Otus* and *Bubo,* and nest or roost in forest habitats (Burton 1973). Several species of ground-nesting owls, however, also possess inconspicuous tufts, that are erected when approached at nests or roosts (e.g., Short-eared Owl *Asio flammeus*, Marsh Owl *A. capensis* and Snowy Owl *Nyctea scandiaca*; pers. obser., Mikkola 1983).

METHODS

From 1978–1989, we observed over 100 Northern Pygmy-Owls in the wild during the breeding and non-breeding seasons. We used two captive Northern Pygmy-Owls to describe concealment posture and theorize reasons for this behavior.

For the exercises, the owls were kept either in outdoor or indoor housing, or tethered on an experimenter's fist. We placed a cat 10 m in front of each owl and allowed the cat to roam freely. The cat was unaware of the owl's presence. We also tethered a Peregrine Falcon (*Falco peregrinus*) 10 m in front of one owl. The falcon was also unaware of the owl's presence. We then approached the

owls ourselves or made passes by them, at and within 10 m. Each exercise was conducted ten times. We photographed and described the owls' reactions. The drawings in Figure 1 were drawn from the photographs.

RESULTS AND DISCUSSION

The two owls were faced with the cat twenty times (ten times each), and one owl with the falcon ten times. On every occasion (N = 30), the owls assumed the concealing posture. Neither owl responded with the concealment posture to our approaches. Figure 1A illustrates the relaxed or normally observed posture and Figure 1B illustrates the concealment posture.

When responding to the stimuli (cat, falcon), the owls changed configuration in one continuous motion. The tufts were erected. As well, the bold white eyebrows and the white rictal bristles surrounding the bill and facial feathers on the lower sides of the face were also erected. The eyes were wide open. Simultaneously, the remainder of the body feathers were compressed tight to the owl's body and one wing was drawn across the front of the body and raised nearly to bill level. The white spotting on the flight feathers and coverts appeared as vertical lines when the wing was drawn across the body. This posture seemed to lengthen the owls' bodies (Fig. 1B).

We examined Northern Pygmy-Owl study skins (N = 7) from the University of Montana Zoology Museum, Missoula, Montana, and observed that the tufts were body contour feathers. We could not distinguish any differences in lengths of the tuft feathers versus other feathers of the head. In contrast, tufts of other owl species (e.g., Great Horned Owl *Bubo virginianus,* Long-eared Owl *Asio otus,* Short-eared Owl) readily could be distinguished and counted.

Tuft erection and concealing posture was never observed during intraspecific confrontations of wild Northern Pygmy-Owls. In fact, this posture was never observed during defense of breeding or wintering territories. Hence, the posture is probably not part of the owls' intraspecific, agonistic behavioral repertoire.

On 4 occasions in the wild, we observed Northern Pygmy-Owls exhibit "tuft" erection and concealment posture when approached by mixed flocks of foraging passerines.

Unlike the Boreal Owl (*Aegolius funereus*) and Northern Saw-whet Owl (*A. acadicus*), which raise the outer crown feathers of their facial disks, and mimic tufts (Catling 1972), Northern Pygmy-Owls actually possess tufts. The Northern Pygmy-Owl also lacks a true facial disk, and its eyes are placed near the top of the head. The tufts arise from the orbital ridge and appear as extensions of the eyebrows, which when relaxed lie horizontally above the eye (Fig. 1A).

There are fifteen species of *Glaucidium* in the world (Amadon and Bull 1988) however, to our knowledge, tufts and concealment posture have been described only in the European Pygmy-Owl (*G. passerinum*) (Scherzinger 1970). Angell (1974), in his drawings of owls, mentions "plumicorns" as tiny horns just behind the eyebrows of a captive Northern Pygmy-Owl, but did not describe them in detail.

Based on our observations of captive and wild Northern Pygmy-Owls, we believe that the posture described has evolved as a cryptic strategy and has nothing to do with species recognition or predator mimicry. Our observations further indicated that this posture may have at least two functions: 1) concealment from potential predators, and 2) concealment from potential prey or a mobbing situation.

Northern Pygmy-Owls are mobbed frequently by small passerines, possibly because they often hunt by day (D.W. Holt, pers. comm.). Altmann (1956) used a number of stuffed owl species to determine mobbing behavior and predator recognition. When he placed a stuffed Northern Pygmy-Owl in an area of wintering Yellow-rumped Warblers (*Dendroica coronata*), six warblers discovered and mobbed the owl. The mobbing then attracted the rest of the flock of approximately 200 individuals. Instances such as this may contribute to selective pressures in the evolution of concealment posture in Northern Pygmy-Owls.

Definitions. Prior to a discussion and review of literature concerning concealment pose of owls, we first address acceptable working definitions. We used terminology taken from Alcock (1975).

Hiding in animals is generally achieved through cryptic coloration and behavior (Alcock 1975). Cryptic coloration includes camouflage, disruptive coloration and countershading. Camouflage is used to disguise, deceive or conceal. In animals, camouflage effectiveness is generally dependent on the capacity of an animal to remain motionless for prolonged periods (Alcock 1975). Disruptive colorations are contrasting bold lines or patches that disrupt the outline of an animal (Alcock 1975). Attention is then drawn to these conspicuous marks which in turn distract from the more subtle features that would

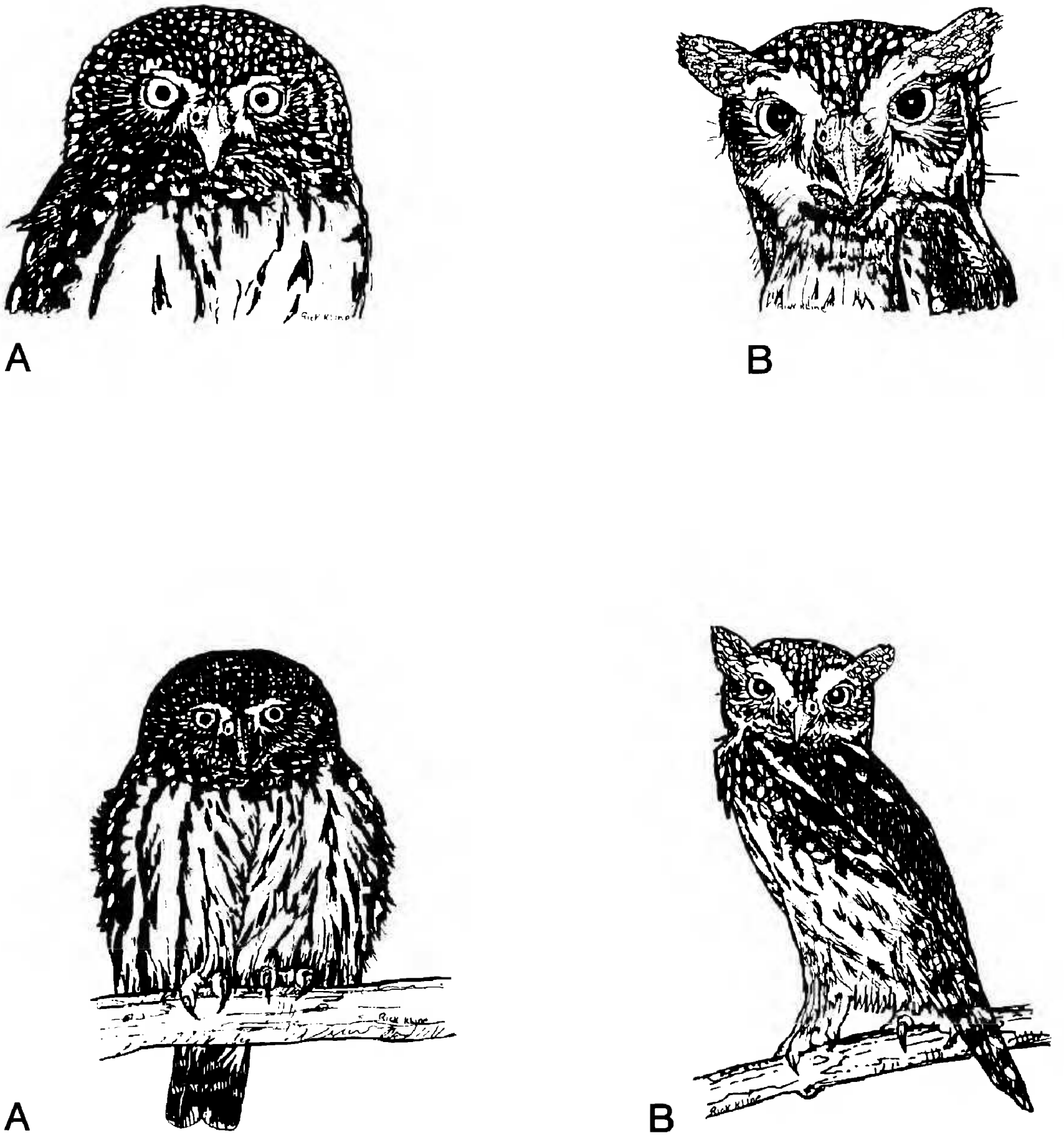

Figure 1. Postures of Northern Pygmy-Owls; A) normal posture, B) tufts or extended eyebrows and concealment posture.

identify a particular animal (Alcock 1975). Color patterns may also be more effective than behaviors (Alcock 1975). Countershading is not pertinent to this discussion.

Literature Review on Tufts and Concealment Posture. Putman (1958) described an Eastern Screech Owl (*Otus asio*) responding to sparrows, by elongating its body, twisting sideways, then raising

and drawing its wing across the side of its body which faced the sparrows. All feathers were compressed against the owl's body. This is also similar to descriptions quoted by Bent (1938) for Eastern Screech Owls, and personal observations (D.W. Holt).

Scherzinger (1971) described a posture in the European Pygmy-Owl (*G. passerinum*), identical to the posture we describe in this manuscript for the Northern Pygmy-Owl. He termed it a concealing posture. Mikkola (1983) termed this same posture by the European Pygmy-Owl as a camouflage posture, and he felt it was a result of a potential threat.

During experiments to describe the reactions of owls to predators, Scherzinger (1971) concluded that tufts on the heads of many owl species were of no "systematic" (not pertaining to systematic classification) value. He further stated that protective coloration further de-emphasized the tufts.

Mysterud and Dunker (1979) proposed a "predator mimicry hypothesis," in which they felt the selective advantage of tufts was to imitate potential mammalian predators by erection of the tufts. For example, they provided comparative drawings of owl/predator confrontations (e.g., Eagle Owl (*Bubo bubo*)/Lynx (*Lynx lynx*); Long-eared Owl/Marten (*Martes martes*); and Short-eared Owl/Red Fox (*Vulpes vulpes*), in which case the owl assumed a defensive posture on its nest. The connotation being, that mammalian predators would retreat when face to face with an apparent conspecific. The authors, however, mention nothing of the well-developed olfactory senses in many mammals, which we think would aid them in distinguishing conspecifics.

Perrone (1981) reviewed three hypotheses concerning the significance of tufts in owls: 1) "species recognition" (Sparks and Soper 1970, Burton 1973), 2) "broken off stub effect" (Sparks and Soper 1970), and 3) "mammalian mimicry" (Mysterud and Dunker 1979). Perrone (1981) concluded that tufts served as camouflage adaptations and concurred with hypothesis two. He also noted that tufts were more common among woodland owl species, however, many species of woodland owls also lack tufts.

Ligon (1968) described the concealment pose of the Elf Owl (*Micrathene whitneyi*) (a round-headed owl) in which the owl changed from a normal perching position, to an elongated stance with feathers compressed. The owl erected its white feathers above the eyes (eyebrows) and white feathers on the lower sides of the facial disk. Further, the owl drew its wing across the front of its body, revealing two white vertical stripes and raised the wing to bill level (similar to Fig. 1B). The vertical stripes appeared to originate along the leading edge of the wing and the scapulars. The eyes were open at all times. Ligon (1968) believed that the white markings served as a disruptive camouflage tactic, and aided the owl in concealment.

Catling (1972) reported the concealment posture of Boreal Owls (*Aegolius funereus*) and Saw-whet Owls (*A. acadicus*) (round-headed) to elongate their bodies and erect the outer facial feathers of the facial disk. Although not true tufts, the posture suggested tufts and made the owls less conspicuous.

In his review of concealing poses of owls, Bondrup-Nielsen (1983) suggested that poses are similar among those species reported, however, some differences between the species suggested different functions. He cited three differences in the poses of owls, that he felt did not support the pose as a function of concealment: 1) open eyes, 2) exposure of white feathers around the eyes, and 3) abrupt manner in which the pose is adopted. Bondrup-Nielsen (1983) felt that the three differences stated above made an owl more conspicuous and were revealing rather than concealing.

Animals use cryptic coloration, behavior and physical tactics to hide. These tactics may be used singly or in combination with one another.

Tufts have probably evolved as a form of cryptic morphology, which aid owls in concealment by resembling non-living objects such as twigs or small branches. The tufts may act as neutral stimuli to predators or mobbers, in which case they may habituate to it (Alcock 1975).

We feel that erection of white feather areas in the facial region and the bold white markings displayed with wing adjustment, fit well into Alcock's (1975) definition of disruptive coloration. This would likely reduce the chances of being detected. Additionally, we see no reason why disruptive and camouflage coloration cannot act synergistically in concealing the owl.

Open eyes may be advantageous, because they allow an owl to monitor the movements of a potential threat. Closed eyes could lead to disastrous results if a potential threat was lethal. If disruptive coloration works, then open eyes may not even be detected and thus cause no harm. The Eastern Screech Owl appears to be the only owl thus far reported that has partially closed eyes during concealment posture.

The abrupt or gradual change into the conceal-

ment posture may relate to observer definitions, or possibly to how much time the owl has to prepare.

Both the tufted and round-headed owls discussed in this manuscript achieve concealment by similar methods. This suggests convergent evolution of this behavior under similar selective pressures. However, concealment posture could simply be a basic owl behavior inherited from the first prototype owl. In any case, every owl mentioned in this manuscript has similar concealment postures. We conclude that posturing, tufts, camouflage, disruptive coloration and open eyes all contribute to concealment behavior.

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